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(54) **Apparatus for combustion enhancing and method**

(57) A gas apparatus for internal combustion engine is disclosed in which recovered hydrocarbon gas vapors from the fuel tank and the hydrocarbon with radical hydrocarbon gas vapors from the crankcase, are mixed together with air and alcohol with water solution in an impeller mixing chamber causing modified hydrocarbon gas vapors and oxygen gas vapors to pass through an electronic ionizer producing negatively charged pre-oxidized hydrocarbon gas vapors, then fed through the air induction system to improve mass of air to mass of fuel ratio in an internal combustion engine.

A method for production of negatively charged pre-oxidized hydrocarbon gas vapors is also disclosed.

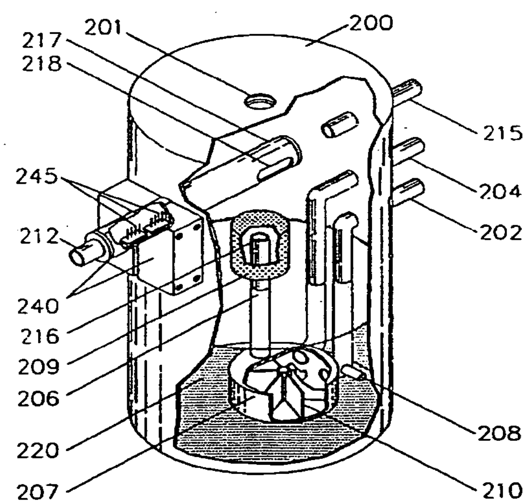

FIGURE 3

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Description

FIELD OF INVENTION

The present invention relates generally to improve engine efficiency particularly, the mass of air and mass of fuel ratio, combustion thermal efficiency and reduction of carbon deposits accumulation in the combustion systems of diesel, petrol and propane internal combustion engines.

This invention make use of recovered hydrocarbon gas vapors vented from the fuel tank and blow-by hydrocarbon with hydrogen gas vapors vented from the positive crankcase ventilation system of an engine.

These vented hydrocarbon gas vapors with air are mixed and passed into a liquid mixture in the apparatus, dissociating the molecular chain of hydrocarbon gas vapors into methane and ethane gas vapors with oxygen, bubbled out then pass through negative ionization process.

These newly produced gas vapors of the apparatus called negatively charged pre-oxidized hydrocarbon gas vapors are then fed through the air induction system of internal combustion engine to improve mass of air to mass of fuel ratio.

BACKGROUND OF THE INVENTION

The internal combustion engine is used to convert the chemical energy of fuel into heat energy and then converts this heat energy into usable mechanical energy. This is achieved by combining the appropriate amounts of air and fuel and burning the mixture in an enclosed cylinder at a controlled rate.

An average air/fuel ratio of good combustion for petrol engine is about 15 parts of air to 1 part of fuel by weight.

Diesel engine operates on a much wider air/fuel ratio, since air intake is not regulated on most diesel engines. Ratio may range from about 20:1 to about 100:1. This fact, plus the high compression of the diesel engine, makes it a fuel efficient engine.

But the ratio of oxygen becomes insufficient due to different kinds of fuel grades and the quality of oxygen entering into the engine. These are some factors that affect energy loss of an internal combustion engine.

The efficiency of existing internal combustion engine illustrated in Figure 1, in converting the potential energy in fuel to mechanical energy is only about 33%. Of the available fuel energy in an engine, about one-third is loss, due to the following factors.

The main factor is pyrolysis, which is caused by the mixing of undesirable gas compounds with hydrocarbons gas vapors vented out from the positive crankcase vent and the fuel tank vent connected to the air induction system 13, of an engine.

The mixing of undesirable gas compound upsets the quality of oxygen to the combustion process.

The other factor is the loss of atmosphere vented out hydrocarbon gas vapors from the fuel tank 12, and the positive crankcase vent 14. These factors contributes to the loss of energy and the imbalance of air and fuel ratio. The remaining one-third energy loss of hydrocarbons gas vapors is the emission of unburnt hydrocarbon through the exhaust system 16. These combustion process result in poor combustion.

Accordingly, it is desirable to provide an apparatus to produce negatively charged pre-oxidized hydrocarbon gas vapors to combine with the air and fuel mixture in the combustion chamber to improve the mass of air to mass of fuel ratio to enhance combustion of an internal combustion engine.

In addition, the ambient air ($N+O_2$) with the negatively charged pre-oxidized hydrocarbon gas vapors ($HC + O_{-2}$) mix with the vaporized fuel in the combustion chambers contains more oxygen, creating greater expansion of the pistons during combustion process. After combustion the exhaust emission contains lower counts of of hydrocarbons(<HC), lower carbon monoxide (<CO), lower oxide of nitrogen (<Nox),lower carbon particulates (<CP) with compound gas elements compose of carbon dioxide (CO_2), nitrogen dioxide (NO_2), sulfur dioxide (SO_2)and extra oxygen (O_2).

Here is the equation that shows what happens after combustion in an engine with the apparatus.

$$HC + N + O_2 + (HC + O_{-2}) \rightarrow {<}HC + {<}CO + {<}NO + {<}CP + CO_2 + H_2O + SO_2 + O_2$$

The first objective of this invention is to provide an apparatus to recover normally lost hydrocarbon gas vapor vented out into the atmoshpere.

The second objective is to pass the recovered hydrocarbon gas vapors through the liquid mixture in the apparatus to form ethane and methane gases associated with oxygen.

The third objective is the process of dissociation hydrocarbon gas vapors in the liquid mixture with the use of impeller, resulting in venting out of the high octane vapors from the liquid solution.

The fourth objective is the process of increasing the oxygen ratio by adding negatively charged pre-oxidized hydrocarbon to the air flowing through the induction system of an engine.

The fifth objective is to improve by providing negatively charged pre-oxidized hydrocarbon gas vapors, to produce high expansion of pistons, to increase the engine power, save fuel consumption, reduce the emission of hydrocarbon gas vapors and achieve higher efficiency of engine performance.

The sixth objective to improve the thermal efficiency of an engine by adding negatively charged oxygen into the combustion chamber of an engine, causing lower amount of oxides of nitrogen.

These and other objects of the invention will become apparent in light of the accompanying specifications, claims, and drawings.

SUMMARY OF THE INVENTION

According to the invention, there is provided an apparatus producing negatively charged pre-oxidized hydrocarbon gas vapors comprising:

two gas inlets, a first connected to a fuel tank vent, a second connected to a engine crankcase vent.

One air inlet and one air outlet to the air induction system:

means for mixing hydrocarbon gas vapors from the first and second gas inlets with mixture of distilled or filtered water, alcohol and turpentine solution to form a gaseous mixture;
double or several ionizer circuits having two sets of output paralleled electrode pins, negative direct current output power ranging from 6000 -v.d.c. to 15000 -v.d.c. or higher for negatively charging the gaseous mixture;

Preferably the alcohol solution is ethanol with a concentration in the range 5% to 30%, turpentine about 5% mixed with distilled or filtered water.

Preferably the mixing means comprises an impeller mixing chamber or several chambers to which the inlets are connected and includes means for mixing the vented gases of hydrocarbon with radical hydrogen and air with the liquid mixture and means for bubbling the vented gases through liquid mixture.

The apparatus further include a divided charcoal canister, a half portion for absorbing vented hydrocarbon gas vapors and ambient air, connected to the fuel tank vent, which are drawn by vacuum effect by the air induction system and a half for air pressure release of the apparatus;

An oil separator filter for trapping oil residue which allows the oil to return back to the engine crankcase source and allowing only the passages of hydrocarbon gas vapours and radical hydrogen gases from the outlet from the engine crankcase vent.

BRIEF DESCRIPTION OF DRAWINGS

An embodiment of the invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an illustration of energy loss in a typical combustion engine.
Figure 2 is a schematic diagram of the apparatus being an embodiment of the invention.
Figure 3 is a part sectional perspective view of the apparatus of Figure 2.
Figure 4 is a sectional perspective view of the charcoal canister of the embodiment of Figure 2.
Figure 5 is a sectional view of an oil separator filter of the embodiment of Figure 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An embodiment of the invention is schematically shown in Figure 2 in which an internal combustion engine 100 is provided with a carburettor 110 for combining air from air intake 120 and fuel from fuel tank 130 and providing the mixture to the cylinders of the engine 100 for combustion.

Blow-by gases from the engine crankcase are vented under positive crankcase pressure through engine crankcase opening 150 and petrol vapour gases are vented from petrol tank 130 through opening 152. The blow-by gases are fed via an oil separator filter 160 and the petrol tank gases are fed via a charcoal canister 170 to the apparatus 140, being an embodiment of the invention.

Figure 3 shows the apparatus 140 in more detail.

The apparatus 140 are illustrated in figure 2 and 3 and comprises a casing 200, provided an opening for liquid solution fill up 201, with the first inlet 202 connected to an oil separator filter 160. From 150 a second inlet 204 from charcoal canister 170, and third inlet and outlet combination 215 from the charcoal canister 170. The outlet 212, is connected to

the air induction system 110 of the engine.

The inlet 202 and 204 are feed into a mixing chamber 207, wherein is a mechanical driven impeller 210. The inlet 202, supplies the radical hydrogen and hydrocarbon gases from the positive crankcase ventilation system outlet 150, through a oil separator filter 160. The inlet 204 is a connection for introducing hydrocarbon gases and air mixture to be mixed within the mixing chamber 207. The liquid solution 220, are drawn into the impeller chamber inlet 208. The inlet 204 through which hydrocarbon gases with air mixture are introduced from the fuel evaporation outlet 152. The inlet 215 draws ambient air which are mix with the gas mixture and acts as an air high pressure release of the apparatus connected to 170. The impeller mixing chamber outlet tube 206, placed on vertical position for disposing the liquid solution through an opening 216, liquid solution overflows through a filter 209, then recycled back to the inlet 208, while the gas mixtures which are introduced through an opening 218, herein the mixtures flows through a tubular channel 217, which acts to guide the flow of gases to 212.

Within the tubular channel are two sets of paralleled electrode pins 245. The two ionizer circuits 240, uses the process of negative ionization to ionize or influence negative electrons to the gas mixtures. The final product of the apparatus 200, are negatively charged pre-oxidised hydrocarbon gas vapors, then fed to an inlet 110. These gas vapors improves the mass of air to mass of fuel ratio. The results are improved fuel consumption and at the same time increased engine power of an internal combustion engine.

The carbon canister 170 is illustrated in Figure 4 and comprises a housing 300 having an inlet pipe 302 and output pipe 308. The pipe 302 connects to an inlet channel 306 adjacent absorbing element 307 comprised of pressed charcoal which on the downstream side is provided with an outlet channel 308 leading to pipe 204 of the apparatus 200. An air inlet 304 is provided at the opposed end of the channel 310.

Volatile hydrocarbon gases vapors which evaporates from the fuel tank vent are fed through to an inlet 302. These hydrocarbon gas vapors are absorbed and lightly held by the charcoal 307. When the engine starts, the hydrocarbon gas vapors are drawn through opening 308 and air flows through channel 304. Since the hydrocarbon gases are lightly held in the charcoal, they are drawn out by the vacuum pressure to an inlet pipe 204, both charcoal element are separated by a plate 315. The coarse charcoal filter 311, is an air filter and hydrocarbon trapping element and as well as an air high pressure release, path 304 of the apparatus 200.

The oil separator filter 160 is shown in figure 5. The oil separator filter comprises a housing 400, having a vapour inlet 402 and vapour outlet 404. A single plate deflector 406, divides the two filter sets allowing gas to pass on the sides and top side of the said plate. Both filter sets have a lower primary circular shape filter holder 407 and lower secondary filter holder 408 with adjacent features upper primary 409 and upper secondary 410, filter holders. The tubular shape primary filter 411 and secondary filter 412, on both sets absorbs oil residue as oil proceeds towards the lower primary holder 413 and lower secondary holder 414 each having at least four oil passages. Most of the oil residues are drawn back to the engine through pipe 402. Preferably 3M type P or oil fill paper material for these filters.

The vented gas vapor mixtures of blow-by hydrocarbon and radical hydrogen gases, fuel tank hydrocarbon gases and alcohol gas vapour passed into the engine from the apparatus is to some extent disassociated by the negative ionization process thus forming ionization of negatively charged pre-oxidized hydrocarbons comprising of negatively charged ionized oxygen, methane and ethane vapors which react with the air and fuel entering in the combustion chambers in a more efficient use of these blow-by and fuel tank gas vapors which otherwise were vented out into the atmosphere.

During the test it was observed that continuing use of the apparatus appears to remove carbon deposits from the engine thus having a carbon cleaning effect, due to the excess of negatively charge oxygen, wherein accumulated carbon deposits are ignited throughout the combustion systems and eventually cleaning the combustion component surfaces. From the positive crankcase ventilation, the oil separator filter 160, further traps oil residues and allowing the flow of radical hydrogen and hydrocarbon gas vapors into the apparatus 140, thus preventing oil residues from entering into the apparatus 140.

Oil consumption is also reduced since the residual oil returns back into the engine.

The embodiment of the invention described is not to be construed as limitative. For example, although shown used with a carburettor intake system, the invention is equally of use with fuel injected petrol engines and other kinds of internal combustion engines such as diesel and propane engines. Although a solution of ethanol or methanol is used in the apparatus 110, other alcohols may be used.

Furthermore, although inlets from the engine crankcase and the petrol tank vent have been shown, the apparatus of the invention may be used with only one inlet from one or the other vent. The embodiment of Figure 3 has been shown with two electronic ionizers 240 .This is not to be construed as limitative, and any number of electronics ionizers may be employed, dependent upon the vented gas mixture flow rate.

The mixing means mixes the gases with the alcohol solution 220 in the embodiment of Figure 3 by mixing the liquid mixture into contact with the gases with air by bubbling the gases through the solution. However, other mixing methods may be used, for example an ultrasonic spraying device may be used instead of the impeller mixing and a pulsating pump vibration mixing device may be used with the embodiment of Figure 3 to assist mixing of the gases with the solu-

tion.

Tests were conducted to evaluate the effect of a test device in accordance with the embodiment of the invention described upon a diesel vehicle's performance in terms of smoke level, fuel consumption and power measurement.

For this purpose, comparative tests were conducted whereby measurement of smoke level, fuel consumption and power measurement were carried out before and after installation of the apparatus to a Mitsubishi Canter 1992 lorry pickup having a two litre fuel injected diesel engine and a Mitsubishi tour bus having an engine capacity 3298cc.

MEASUREMENT PROCEDURE (MITSUBISHI CANTER 1992 LORRY PICKUP)

1. Smoke Level

The smoke levels were measured using a Hartridge Smoker.

2. Fuel Consumption Measurement

a. At the constant speed.
This test was carried out while the test vehicle is being driven on a chassis dynamometer simulating on-the-road driving condition. The amount of fuel consumed in 10 minutes is measured while the vehicle is being driven at the constant speed of 90 km/h.
b. At the medium and maximum load
This test were carried out while the test vehicle is being driven on a chassis dynamometer simulating on-the-road driving condition. The load were applied to the test vehicle which for medium load was 0.67 kN and for maximum load was 1.33 kN. The amount of fuel consumed in 1 minute is measured while the vehicle is being driven at the both load (medium and maximum) at the speed of 20 km/h.
c. Power Measurement
The maximum power of the test vehicle was measured using a chassis dynamometer.

EQUIPMENT

1. Hartridge Smokemeter MK III.
2. PLU 401/108 Fuel Metering System.
3. MAHA Chassis Dynamometer.

TEST PROCEDURE

1. Carry out measurements tests on smoke level, fuel consumption and power measurement.
2. Install the device in the test vehicle as described in I.
3. Run for 200 km.
4. Repeat step 1.

TEST RESULTS

1. At the Constant Speed 90 km

		WITHOUT DEVICE			WITH DEVICE		
Text Speed (km/h)	Sampling Time (min)	Fuel Consumed (litre)	Average (l/h)	Average (l/h)	Fuel Consumed (litre)	Average (l/h)	Average (l/h)
90	10	1.3548	8.12	8.0730	1.3170	7.90	7.903
		1.3348	8.01		1.3168	7.90	
		1.3486	8.09		1.3185	7.91	
		-	-		-	-	

2. At Medium Load 0.67 kN

		WITHOUT DEVICE			WITH DEVICE		
Text Speed (km/h)	Sampling Time (min)	Fuel Consumed (litre)	Average (l/h)	Average (l/h)	Fuel Consumed (litre)	Average (l/h)	Average (l/h)
20	1	0.0740-	4.40	4.342	0.0701	4.18	4.126
		0.0725	4.31		0.0690	4.10	
		0.0715	4.27		0.0677	4.04	
		0.0729	4.35		0.0694	4.14	
		0.0734	4.38		0.0698	4.17	

3. At Maximum Load 1.33 kN

		WITHOUT DEVICE			WITH DEVICE		
Text Speed (km/h)	Sampling Time (min)	Fuel Consumed (litre)	Average (l/h)	Average (l/h)	Fuel Consumed (litre)	Average (l/h)	Average (l/h)
20	1	0.0938	5.59	5.566	0.0870	5.18	5.200
		0.0933	5.56		0.0862	5.14	
		0.0931	5.55		0.0872	5.20	
		0.0937	5.59		0.0879	5.24	
		0.0735	5.54		0.0877	5.24	

SUMMARY OF TEST RESULTS

4. Fuel consumption test at the constant speed

TEST SPEED	WITHOUT DEVICE	WITH DEVICE	PERCENTAGE DIFFERENCE
90 km/h	8.97 L/100 km	8.78 L/100 km	-2.12 %

5. Fuel consumption test at the medium load 0.67kN

TEST SPEED	WITHOUT DEVICE	WITH DEVICE	PERCENTAGE DIFFERENCE
20 km/h	21.71 L/100 km	20.63 L/100 km	-4.97 %

6. Fuel consumption test at the maximum load 1.33 kN

TEST SPEED	WITHOUT DEVICE	WITH DEVICE	PERCENTAGE DIFFERENCE
20 km/h	27.83 L/100 km	26.00 L/100 km	-6.58 %

7. Smoke Level Test

	WITHOUT DEVICE	WITH DEVICE	PERCENTAGE DIFFERENCE
SMOKE LEVEL (HS	84	37	-55.95 %

8. Maximum Power Test

	WITHOUT DEVICE	WITH DEVICE	PERCENTAGE DIFFERENCE
MAXIMUM POWER (	39	42	+7.69 %

SUMMARY

1. Fuel consumption at the constant speed 90 km/h reduced by 2.12%.
2. Fuel consumption at the medium load 0.67 kN and the speed 20 km/h reduced by 4.97%.
3. Fuel consumption at the maximum load 1.33 kN and the speed 20 km/h reduced by 6.58%.
4. Smoke level reduced by 55.95%.
5. Maximum power increased by 7.69%.

METHOD OF TEST (MITSUBISHI TOUR BUS)

A comparative study on the performance of the vehicle in terms of exhaust emission was conducted before and after the installation of the device. The emission test was carried out at the exhaust pipe and the Positive Crankcase Ventilation (PCV) while the engine was running at idle spped and at 2000 rpm:

a) Before installation of device
b) After installation of device and a 509km drive.

Ignition timing of the engine was adjusted by 3-5 degree (1/8 turn) advanced after the installation of the Enemax. This adjustment was said to be essential and was part of the application procedure for the device.

The gases emitted from the vehicle exhaust were sampled and analaysed for the following:

1. Carbon dioxide, Carbon monoxide and Hydrocarbons
Horiba automotive emission analyzer
2. Nitrogen oxide as NO_2
United States Environmental Protection Agency Method 7.

TEST RESULTS

1) At idle speed

Test Item	WITHOUT DEVICE		WITH DEVICE	Effect of Device on gas emission
Sampling point	PCV	Exhaust	Exhaust	
Carbon dioxide (CO_2), % v/v	0.14	3.00	2.06	Reduced by 34.4%
Carbon monoxide (CO), % v/v	< 0.01	0.02	0.03	No significant effect
Hydrocarbons (HCs), ppm	63.2	24.3	20.8	Reduced by 76.2%
Nitrogen oxide as NO_2, ppm	-	84	46	Reduced by 45.2%

2) At high speed (about 2000 rpm)

Test Item	WITHOUT DEVICE		WITH DEVICE	Effect of Device on gas emission
Sampling point	PCV	Exhaust	Exhaust	
Carbon dioxide (CO_2), % v/v	0.23	3.70	2.46	Reduced by 37.4%
Carbon monoxide (CO), % v/v	< 0.01	0.04	0.04	No significant effect
Hydrocarbons (HCs), ppm	60.3	26.3	17.2	Reduced by 80.1%
Nitrogen oxide as NO_2, ppm	-	116	46	Reduced by 60.3%

3) Smoke capacity test

Test Item	WITHOUT DEVICE	WITH DEVICE	Effect of Device on gas emission
Smoke capacity, HSU	90	34	Reduced by 62.2%

Claims

1. Apparatus for an internal combustion engine comprising:-

   a first gas inlet connected to a fuel tank vent to take hydrocarbon gases from said tank.
   a second gas inlet connected to an engine crankcase vent to take hydrocarbon gases from the said crankcase,
   a third gas inlet for air,
   means for mixing hydrocarbon gas vapors from the first gas inlet, hydrocarbon gas vapors from the second gas inlet and air from the third gas inlet with a liquid mixture of water and alochol,
   means to expel said gas mixture from the mixing means, an ionizer or several to ionize the said gas mixture to form negatively charged pre-oxidized hydrocarbon gas vapors,
   an outlet connected to the air induction system for internal combustion engine,

2. Apparatus as claimed in Claim 1 further comprising a two gas inlets connectable to the other of the fuel tank vent and the engine crankcase vent, the further inlet being connected to the mixing means.

3. Apparatus as claimed in Claim 1 wherein the mixing means comprises means for spraying the gases into contact with the liquid mixture.

4. Apparatus as claimed in Claim 1, wherein the mixing means comprises an impeller mixing chamber in which the

hydrocarbon gas vapors from the crankcase and fuel tank vent with air are passed through the liquid mixture then bubbled to vent the gas mixture.

5. Apparatus as claimed in Claim 4 wherein the mixing employs ultrasonic spraying device.

6. Apparatus as claimed in Claim 4 wherein the mixing means comprises means for mixing the vented gases into contact with the liquid mixture by electronic motor driven mechanical impeller mixing device.

7. Apparatus as claimed in Claim 4 wherein the mixing means has an electronic or mechanical pump for pumping the solution through the impeller mixing chamber.

8. Apparatus as claimed in any one of the preceding claims wherein the liquid mixture has an alochol concentration in the range 5% - 30% all organic and the balance being filtered or distilled water.

9. Apparatus as claim in any one of the preceding claims wherein the liquid mixture has 2% to 15% turpentine and the balance being filtered or distilled water.

10. Apparatus as claimed in further comprising a charcoal canister having two separated charcoal element which absorbs hydrocarbon gas vapors.

11. Apparatus as claimed in Claim 10 having a first inlet connection from the fuel tank vent.

12. Apparatus as claimed in Claim 10 having a second inlet and a coarse charcoal element for air pressure release and air filter of the apparatus.

13. Apparatus as claimed in Claim 10 wherein the second charcoal element includes fine charcoal for absorbing hydrocarbon gas vapors to be mixed with air.

14. Apparatus as claimed in Claim 1 further comprising an oil separator filter connected to the second gas inlet from the engine crankcase vent to the apparatus.

15. Apparatus as claimed in Claim 14 wherein the separator includes an oil filter.

16. Apparatus as claimed in Claim 14 or Claim 15 wherein the separator includes means for trapping oil and carbon particles, and means of the oil returning back into the engine crankcase.

17. Apparatus as claimed in Claim 11 wherein the trapping means comprises a plurality of filter members forming a tortuous path for the gases.

18. Apparatus as claimed wherein vented hydrocarbon gas vapors when mix into the liquid mixture by means of an impeller in a mixing chamber vents out high octane gas vapors from a liquid mixture.

19. Apparatus as claim wherein the hydrocarbon gas vapors recovered from the fuel tank vent from only the engine crankcase vent or only gas vapors from the fuel tank vent could be recovered into the apparatus to provide negatively charged pre-oxidized hydrocarbon gas vapors.

20. Apparatus as claimed wherein negatively charged oxygen gas vapours are introduced to the combustion systems to increase piston compression and expansion of an internal combustion engine.

21. Apparatus as claimed in any one of the preceding claims wherein the ionizer circuits applied in parallel manner, having each an output power of 1000 negative volts to 30,000 negative volts.

22. Apparatus as claimed wherein negatively charged pre-oxidized hydrocarbon gas vapors are added into the combustion chambers for improving the fuel consumption, thermal efficiency and reduction of carbon deposits of an internal combustion engine.

23. Apparatus as claimed wherein recovered vented hydrocarbon gas vapors are recovered to form ethane and methane hydrocarbon gases, mixing with negatively charged oxygen gas vapors for further combustion.

24. Apparatus as claimed wherein negatively charged pre-oxidized hydrocarbon gas vapors combining with the air flowing through the air induction system to increase oxygen ratio of an internal combustion engine.

25. Apparatus as claimed wherein negatively charged pre-oxidized hydrocarbon gas vapors with ambient air which improves mass of air to mass of fuel for an internal combustion engine.

26. Apparatus as claimed wherein hydrocarbon gas vapors loss from fuel tank and positive crankcase ventilation system of an engine are fed through the apparatus and then fed to air induction system of an internal combustion engine.

27. A method to improve the ratio of mass of air to mass of fuel by;

taking vented hydrocarbon gas vapors from a fuel tank,
taking vented hydrocarbon gas vapors from engine crankcase,
taking ambient air from the atmosphere,
mixing the vented hydrocarbon gas vapors and ambient air with a liquid mixture of water and alochol,
causing dissociation of molecular chains of hydrocarbon gas vapors,
expelling the dissociated molecular chains of hydrocarbon gas vapors from the liquid mixture,
passing the said dissociated molecular chains of hydrocarbon gas vapors through one or more ionizers to form negatively charged pre-oxidized hydrocarbon gas vapors,
introducing the negatively charged pre-oxidized hydrocarbon gas vapors into the air induction system of the internal combustion engine.

28. Method according to Claim 27, whrein vented hydrocarbon gas vapors when mix into the liquid mixture by means of an impeller in a mixing chamber vents out high octane gas vapors from a liquid mixture.

29. Method according to Claim 27, wherein the hydrocarbon gas vapors recovered from the fuel tank vent from only the engine crankcase vent or only gas vapors from the fuel tank vent could be recovered into the apparatus to provide negatively charged pre-oxidized hydrocarbon gas vapors.

30. Method according to Claim 27, wherein negatively charged oxygen gas vapors are introduced to the combustion system to increase piston compression and expansion of an internal combustion engine.

31. Method according to Claim 27, wherein negatively charged pre-oxidized hydrocarbon gas vapors are added into the combustion chambers for improving fuel consumption, thermal efficiency and reduction of carbon deposits of an internal combustion engine.

32. Method according to Claim 27, wherein recovered vented hydrocarbon gas vapors are recovered to form ethane and methane hydrocarbon gases, mixing with negatively charged oxygen gas vapors for further combustion.

33. Method according to Claim 27, wherein negatively charged pre-oxidized hydrocarbon gas vapors combining with the air flowing through the air induction system to increase oxygen ratio of an internal combustion engine.

34. Method according to Claim 27, wherein negatively charged pre-oxidized hydrocarbon gas vapors with ambient air which improves mass of air to mass of fuel for an internal combustion engine.

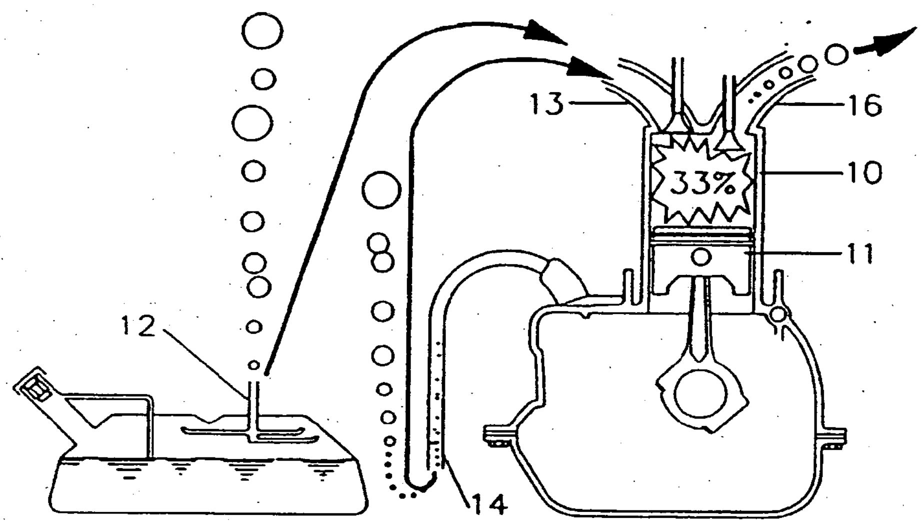

FIGURE 1

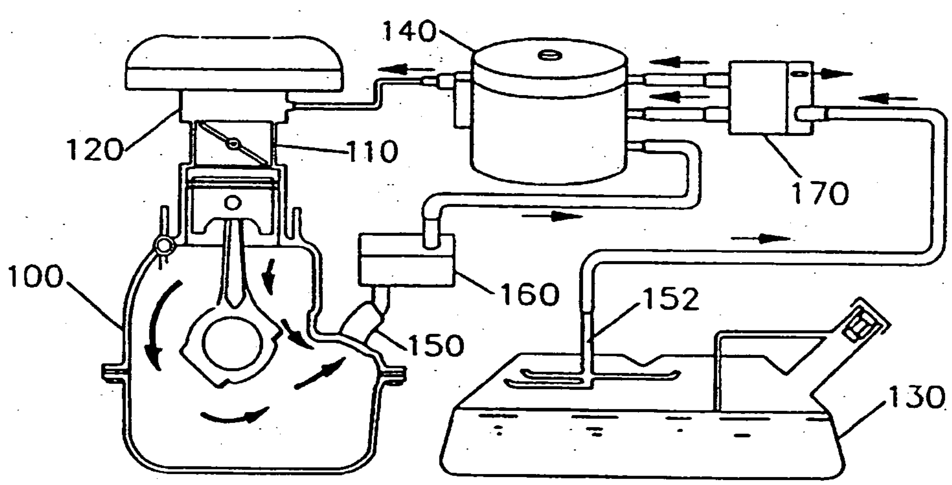

FIGURE 2

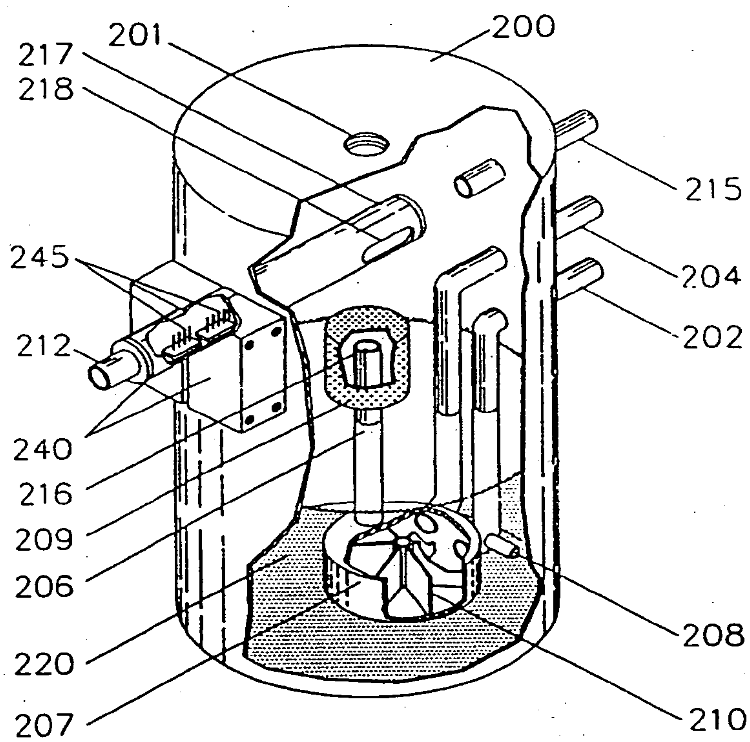
200
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FIGURE 3

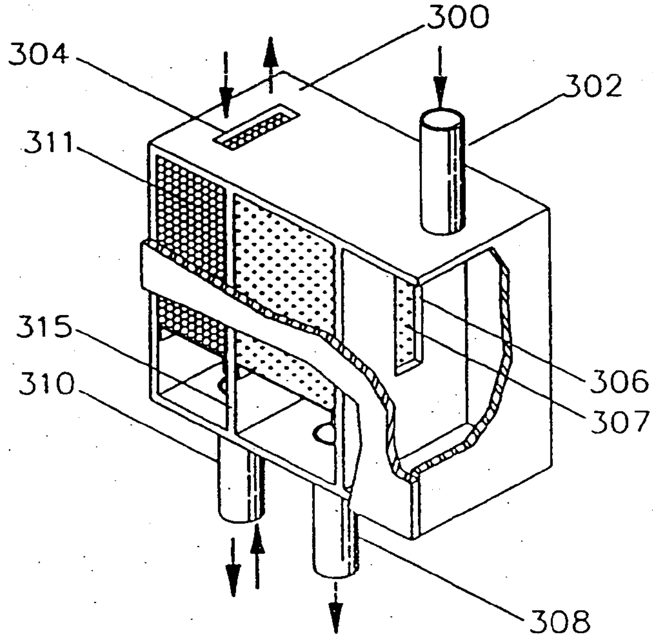

FIGURE 4

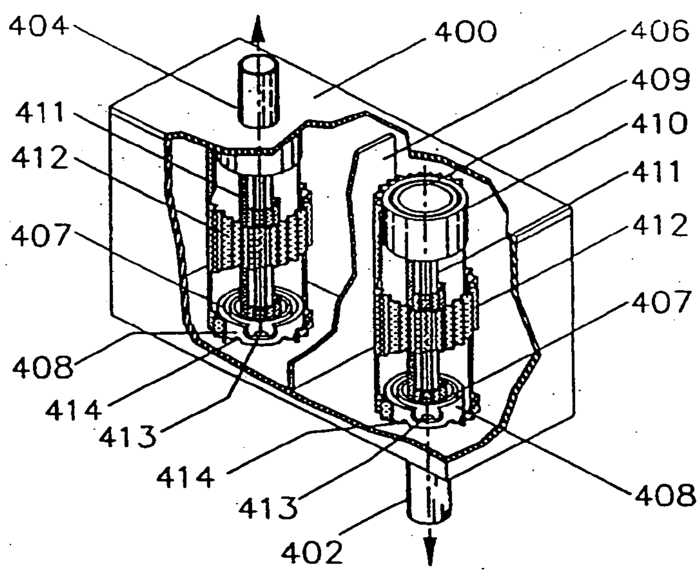

FIGURE 5

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 1253

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 601 683 A (GEKKO INT) * column 4, line 55 - column 5, line 5 * * column 5, line 29 - line 38 * * column 5, line 50 - column 6, line 13 * * column 6, line 27 - line 41; figures 2,3 *	1,27	F01M13/04 F02M25/08
A	US 3 172 348 A (BERG) * column 2, line 35 - line 69 * * column 3, line 49 - line 57; figures 1,3 *	1,27	
A	US 3 517 654 A (SARTO) * column 2, line 64 - column 3, line 4 * * column 3, line 22 - line 31 * * column 3, line 60 - line 63 * * figure 1 *	1,27	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 March 1998	Joris, J

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